DECISION ON APPEAL

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The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

4101-0130-0X

Paper No. 21

MAILED

Appeal to CAFC
Req. for Rehearing
8-29-01
(NON-EXT)

UNITED STATES PATENT AND TRADEMARK OFFICE

JUN 29 2001

PAT. & T.M. OFFICE
BOARD OF PATENT APPEALS
AND INTERFERENCES

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte RICARDO COZAR and MARIE-PAUL SOLIGNAC

Appeal No. 1998-2219
Application No. 08/641,233

HEARD: May 10, 2001

Before KIMLIN, PAK and LIEBERMAN, Administrative Patent Judges.

KIMLIN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 1-8, 12 and 13, all the claims remaining in the present application. Claim 1 is illustrative.

1. An Fe-Ni-Co alloy whose chemical composition comprises, by weight based on total weight:

$$32\% \leq Ni \leq 34\%$$
$$3.5\% \leq Co \leq 6.5\%$$
$$0\% \leq Mn \leq 0.1\%$$
$$0\% \leq Si \leq 0.1\%$$
$$0\% \leq Cr \leq 0.1\%$$
$$0.005\% \leq C \leq 0.02\%$$
$$S \leq 0.001\%$$
$$0.0001\% \leq Ca \leq 0.002\%$$
$$0.0001\% \leq Mg \leq 0.002\%$$

and further comprising iron and impurities resulting from smelting; the chemical composition of the alloy furthermore satisfying the relationships:

$$Co + Ni \leq 38.5\%$$
$$Co + 0.5 \times Ni \geq 20\%$$
$$Co + 5 \times Ni \geq 165.5$$

and

$$S \leq 0.02 \times Mn + 0.08 \times Ca + 0.6 \times Mg$$

wherein said alloy has a martensitic transformation start point of less than -50°C, an average coefficient of thermal expansion between 20° and 100°C of less than or equal to 0.7×10^{-6}/°K and a mean coefficient of thermal expansion between 80°C and 130° of less than or equal to 1×10^{-6}/°K.

The examiner relies upon the following references as evidence of obviousness:

Ishikawa et al. (Ishikawa)	4,832,908	May 23, 1989
Kato et al. (Kato)	5,164,021	Nov. 17, 1992
Inoue et al. (Inoue)	5,234,512	Aug. 10, 1993
Fukuda et al. (Fukuda)	5,236,522	Aug. 17, 1993
Hidefuji et al. (JP '021) (Japanese patent publication)	04-221021	Aug. 11, 1992
Hidefuji et al. (JP '631) (Japanese patent publication)	04-224631	Aug. 13, 1992

Appellants' claimed invention is directed to an Fe-Ni-Co alloy of the recited formula having the specified properties, such as martensitic transformation start point and average coefficient of thermal expansion, that is used to form shadow masks. According to appellants, shadow masks made from the claimed alloy "avoid the common problems which occur in iron-based shadow masks" (page 2 of principal brief).

Appellants have not set forth in the ARGUMENT section of the brief arguments that are reasonably specific to any particular claim on appeal. Accordingly, all the appealed claims stand or fall together with claim 1. In re Nielson, 816 F.2d 1567, 1572, 2 USPQ2d 1525, 1528 (Fed. Cir. 1987); Ex parte Ohsumi, 21 USPQ2d 1020, 1023 (Bd. Pat. App. & Int. 1991). See also 37 CFR § 1.192(c)(7) and (c)(8) (1997).

Appealed claims 1-6 and 9 stand rejected under 35 U.S.C. § 103 as being unpatentable over either JP '631 or JP '021. Claims 1-8 and 12-13 stand rejected under 35 U.S.C. § 103 as being unpatentable over Inoue in view of Fukuda, or Ishikawa or Kato.

We will not sustain the examiner's rejection of claims 1-6 and 9 under 35 U.S.C. § 103 over either JP '631 or JP '021 for essentially those reasons expressed by appellants. While both references disclose Fe-Ni-Co alloys comprising Ni and Co in broad ranges that encompass the considerably narrower claimed ranges, neither reference teaches or suggests that the disclosed alloys possess the claimed martensitic transformation start point, average coefficient of thermal expansion between 20°C and 100°C and mean coefficient of thermal expansion between 80°C and 130°C, let alone the recited relationships for Co and Ni. Although it is possible to pick and choose amounts of Ni and Co from the referenced disclosures to fall within the claimed ranges, the

examiner has not established that all the alloys within the referenced disclosures inherently possess the properties specified in the appealed claims. Neither reference discusses the problems associated with shadow masks set forth in appellants' specification and, therefore, there would have been no motivation for one of ordinary skill in the art to make the particular selections from the referenced disclosures to arrive at the claimed alloys. While the examiner states at page 4 of the Answer that "the selection of the proportions of elements would appear to require no more than routine investigation by those ordinary [sic, ordinarily] skilled in the art," the examiner has not established the requisite motivation to conduct such routine investigation. In our view, too great a degree of selection would have been required by one of ordinary skill in the art from the disclosures of the references to arrive at the claimed alloys.

We now turn to the examiner's rejection of all the appealed claims under § 103 over Inoue in view of either Fukuda, Ishikawa or Kato. Although we have thoroughly considered each of appellants' arguments for patentability, we will sustain the examiner's rejection. We agree with the examiner's conclusion and supporting reasoning that one of ordinary skill in the art would have found it obvious to formulate the claimed alloy and use it to form a shadow mask. For instance, Inoue discloses an

iron alloy for forming a shadow mask comprising the claimed 34 wt.% nickel as well as silicon, carbon and sulfur in the claimed amounts. Although Inoue does not teach the inclusion of cobalt in the alloy, we concur with the examiner that Fukuda, Kato and Ishikawa evidence the obviousness of adding cobalt to the alloy of Inoue in the recited amounts, and utilizing such alloy to produce a shadow mask. Indeed, while appellants characterize Example 8 of Fukuda as the only relevant example, we find Fukuda's Examples 4-7 and 9 to be at least, if not more, relevant. Appellants' specification, at page 5, discloses that the carbon content of the alloys should be at least 0.005% in order to achieve the claimed martensitic transformation start point (S_s), whereas the carbon content of Fukuda's Example 8 is only 0.002 wt.%. On the other hand, Examples 4-7 of Fukuda all contain carbon in the claimed amounts and, therefore, it is reasonable to conclude that the exemplified alloys possess the claimed martensitic transformation start point. Also, and not insignificantly, Examples 4-7 of Fukuda exhibit the claimed average coefficient of thermal expansion between 20°C and 100°C. Accordingly, it would seem that the alloys of Fukuda reasonably appear to be essentially the same as those encompassed by the claims on appeal. In re Spada, 911 F.2d 705, 708, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990); In re Best, 562 F.2d 1252, 1255,

195 USPQ 430, 433 (CCPA 1977). Consequently, we find that it is appellants' burden to demonstrate with objective evidence that alloys within the scope of the appealed claims are patentably distinct from those fairly taught by Fukuda. While appellants' declaration demonstrates the significance of the claimed amounts of elements in the alloy to obtain the desired properties, the declaration fails to present a side-by-side comparison with alloys of the prior art, particularly Fukuda.

In conclusion, based on the foregoing, the examiner's decision rejecting the appealed claims is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

EDWARD C. KIMLIN)
Administrative Patent Judge)
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CHUNG K. PAK) BOARD OF PATENT
Administrative Patent Judge) APPEALS AND
) INTERFERENCES
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)
PAUL LIEBERMAN)
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REPLY BRIEF

4101-0130-55X

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF: :

Ricardo COZAR et al. : GROUP ART UNIT: 1308

SERIAL NO: 08/641,233 :

FILED: April 30, 1996 : EXAMINER: IP

FOR: FE-CO-NI ALLOY AND USE FOR THE MANUFACTURE OF A SHADOW MASK

REPLY BRIEF

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

SIR:

Responsive to the Examiner's Answer of January 7, 1998, and under the provision of 37 C.F.R. §1.193(b), Appellants submit herewith a Reply Brief.

REMARKS

The present invention is directed to an iron-nickel-cobalt alloy containing 32-34% nickel and among other limitations, 3.5-6.5% cobalt which alloy provides physical characteristics that avoid the common problems that occur in iron-based shadow masks. The present invention also provides for a method of making a shadow mask using the alloy, as well as a shadow mask foil made from the alloy.

In the present invention, three inequalities define the relationship between the amounts of nickel and cobalt present in the alloy:

$$Co + Ni \leq 38.5\%$$

$$Co + (0.5 \times Ni) \geq 20\%$$

$$Co + (5 \times Ni) \geq 165.5\%$$

By satisfying the three inequalities above, the iron-nickel-cobalt alloy of the present invention has a martensitic transformation start point of less than -50°C, an average coefficient of thermal expansion between 20°C and 100°C of less than or equal to 0.7×10^{-6}/°K, and a mean coefficient of thermal expansion between 80°C and 130°C of less than or equal to 1×10^{-6}/°K (see specification, page 4, lines 17-26 to page 5, lines 1-4). These properties of the alloy provide shadow masks that are highly resistant to image defects (e.g. local doming) caused by localized heating in the mask (see page 3, lines 20-26 to page 4, lines 1-16).

None of the cited references, either alone or in combination, disclose or suggest the three inequalities that define the relative amounts of nickel and cobalt in the alloy of the present invention. Moreover, none of the references suggest that iron-nickel-cobalt alloys satisfying these inequalities have martensitic transformation points and thermal expansion coefficients that make them superior materials for shadow masks.

In the Examiner's Answer, several arguments are made attempting to support a case of *prima facie* obviousness against the present invention in view of the cited references. Arguments are also put forth suggesting that Appellants' experimental data comparing the claimed invention and the cited references is not adequate evidence of non-obviousness. Appellants will now address each of these arguments in turn.

1. At page 8, lines 15-26 of the Examiner's Answer, the Examiner argues that the claimed invention is obvious over JP 04-224,631 (Japan '631) and JP 04-221,021 (Japan '021) because each of these references describe iron-nickel-cobalt alloy compositions with broad ranges of nickel (15-55%) and cobalt (over 5-30%) that encompass the ranges of these elements in the present invention. The Examiner supports this argument by stating that there

is no invention in the discovery of a general formula if it covers a composition described in the prior art (page 8, lines 17-22).

Appellants submit that the three claimed Ni-Co inequality limitations define the weight percent ranges of nickel and cobalt critical for making an alloy having all the physical properties of the claimed invention. Thus, even though the broad ranges of nickel and cobalt described in JP 04-224,631 (Japan '631) and JP 04-221,021 (Japan '021) encompass the much narrower ranges of these elements in the claimed invention, the references do not teach or suggest the *simultaneous* particular ranges or the criticality of the claimed ranges in making an alloy for a shadow mask that avoids the image distortion problems found in conventional, iron based shadow masks. Applicants have provided data, supported by a declaration filed on July 3, 1997, that show iron-nickel-cobalt alloys that satisfy the limitations of JP 04-224,631 (Japan '631) and JP 04-221,021 (Japan '021), do not have the physical properties of the claimed invention:

Alloy Examples 2, 3, and 4 from the data submitted in the Amendment of January 3, 1997 contained 31.5%, 30.5%, and 31% by weight of nickel, respectively. The minimum amount of nickel required is at least 32% by weight. In all three examples, the martensitic transformation start point (M_s) was above the -50°C maximum temperature, and the alloy did not have the required physical properties of the claimed invention.

Alloy Examples E and F from the same data contained amounts of nickel and cobalt within the range of the claimed invention, but they did not satisfy one of the Ni-Co inequality limitations, i.e. $Co + (0.5 \times Ni) \geq 20\%$. For Examples E and F, the $Co + (0.5 \times Ni)$ value were just slightly less than 20% at 19.85% and 19.925%, respectively. Despite being that close to satisfying the inequality $Co + (0.5 \times Ni) \geq 20\%$, the alloys of Examples E and F had mean coefficients of thermal expansion between 80°C and 130°C of 1.17×10^{-6}/°K and

1.14×10^{-6}/°K, respectively, outside the claimed range of less than or equal to 1×10^{-6}/°K for this physical property.

Appellants further point out that the amounts of manganese (Mn) used in JP 04-224,631 (Japan '631) and JP 04-221,021 (Japan '021) is between 0.1% and 1%. In contrast, the claimed invention requires that the amount of manganese in the alloy be 0.1% at the most. In the present invention, the manganese content is low as because increasing the amount of Mn in the alloy increases its coefficient of thermal expansion (see specification, page 5, lines 15-21). By increasing the Mn content above 0.1%, the low coefficients of thermal expansion required by the claimed invention cannot be achieved.

There is no teaching or suggestion in either JP 04-224,631 (Japan '631) or JP 04-221,021 (Japan '021) that the amount of Mn should be as low as possible to reduce the thermal expansion coefficient of an alloy. In fact, these references teach away from an alloy with an Mn content of 0.1% or less by requiring that the minimum amount of Mn be 0.1%. Accordingly, Appellants submit that Claims 1-6 are patentable over JP 04-224,631 (Japan '631) and JP 04-221,021 (Japan '021), and that the Examiner's rejection be REVERSED.

2. The Examiner argues that the Appellants have based their determination of the non-obviousness of Inoue in view of Fukuda, Ishikawa or Kato by comparing these references *individually* against the claimed invention (Examiner's Answer, page 10, lines 23-25 to page 11, lines 1-4. On the contrary, Appellants have shown that the *combination* of Inoue with Fukuda, Ishikawa, or Kato does not teach or suggest the iron-nickel-cobalt alloy of the claimed invention.

The Examiner argues that the iron-nickel alloy described in Inoue, combined with the cobalt used in the alloys described in Fukuda or Kato will produce and iron-nickel-cobalt

shadow mask having the physical properties of the claimed invention (page 6, lines 15-19). However, the nickel content of the alloy in Inoue is 34 to 38%, while the range of nickel in the claimed invention is 32 to 34%. Appellants have shown with experimental data that the nickel content is critical to making an alloy that has all the required physical properties of the present invention. Thus, the Examiner's assertion that combining a iron-nickel alloy with 34 to 38% nickel with an amount of cobalt suggested by Fukuda or Kato will produce an iron-nickel-cobalt alloy having all the required physical properties of the claimed invention is not supported.

Appellants have explained that Inoue, which describes iron-nickel *sheet* alloys, deals with a completely different metallurgical art than Ishikawa, which describes low thermal expansion *cast* alloys that are not used for shadow masks. The Examiner argues that Inoue and Ishikawa are related art because Inoue is concerned with improving the etching adaptability of iron-nickel alloys, and Ishikawa suggests that the addition of cobalt improves the etching adaptability of iron-nickel alloys (Examiner's Answer, page 6, lines 3-7). However, Appellants can only find a discussion in Ishikawa that describes using cobalt to broaden the range of the low expansion coefficient of a cast alloy (column 3, lines 24-30). Thus, Appellants maintain that Inoue and Ishikawa are not analogous art, and that one of ordinary skill in the art would have no motivation to combine these references.

Appellants submit that the physical properties of the alloys of the present invention require that all the relationships between nickel and cobalt described in the claimed invention be satisfied. Simply combining the cited references to show an alloy that has 32 to 34% wt. nickel and 3.5 to 6.5% wt. cobalt does not insure that the alloy has the inherent physical properties of the claimed invention. Example 8 in Fukuda, for example, has 33.5% nickel and

4.1% cobalt, and has an average thermal expansion coefficient between 30°C and 100°C of 1.01×10^{-6}/°K, which is above the upper limit required by the present invention.

Finally, the three Ni-Co inequality limitations of the claimed invention are neither taught nor suggested by Inoue, Fukuda, Ishikawa or Kato, either alone or in combination. Moreover, there is no motivation to look for these inequality limitations in the references because there is no suggestion in any of the references that the physical properties of the alloy of the claimed invention produce a shadow mask that avoids the image distortion problems seen in conventional, iron-based masks. Accordingly, Appellants maintain that the claimed invention is not obvious over Inoue in view of Fukuda, Ishikawa or Kato, that Claims 1-8, 12 and 13 are patentable over a combination of these references, and that the Examiner's rejection be REVERSED.

3. The Examiner argues that the Appellants have not presented any factual experimental data showing that the ranges of nickel and cobalt defined in the present invention are critical and that they provide unexpected results (page 9, lines 1-4). Appellants respectfully disagree with the Examiner's statement, and note that Examples 2, 3, 4, E and F from the data submitted in the Amendment of January 3, 1997 show iron-nickel-cobalt alloys with amounts of nickel and cobalt that did not satisfy the all the requirements of the claimed invention. As a result, these alloys did not have the necessary physical characteristics to be made into shadow masks that avoided the image distortion problems of conventional iron-based masks.

As Appellants have explained above, alloy Examples 2, 3, and 4 contained 31.5%, 30.5%, and 31% by weight of nickel, respectively. The minimum amount of nickel required is at least 32% by weight. In all three examples, the martensitic transformation start point (M_s)

was above the -50°C maximum temperature, and the alloy did not have the required physical properties of the claimed invention.

Furthermore, alloy Examples E and F contained amounts of nickel and cobalt within the range of the claimed invention, but they did not satisfy one of the Ni-Co inequality limitations, i.e. Co + (0.5 × Ni) ≥ 20%. For Examples E and F, the Co + (0.5 × Ni) value were just slightly less than 20% at 19.85% and 19.925%, respectively. Despite being that close to satisfying the inequality Co + (0.5 × Ni) ≥ 20%, the alloys of Examples E and F had mean coefficients of thermal expansion between 80°C and 130°C of 1.17×10^{-6}/°K and 1.14×10^{-6}/°K, respectively, outside the claimed range of less than or equal to 1×10^{-6}/°K for this physical property.

Appellants submit that the Examples described above, obtained from the data submitted in the amendment of January 3, 1997, and also submitted in the Declaration filed with the Office on July 3, 1997, demonstrate that the ranges of nickel and cobalt defined in the present invention are critical for producing and alloy that has the physical properties of the claimed invention.

4. The Examiner argues that it would be obvious to one of ordinary skill to take separate ingredients that each have some, but not all, of the desired physical properties of the claimed invention and combine them together to produce the claimed alloy (page 11, lines 4-8). Appellants respectfully disagree with the Examiner's assumption that the iron-nickel-cobalt masks of the present invention merely represent the sum of the physical properties of metal elements and alloys described in the references. It is well appreciated in the metallurgical arts that when elements like iron, nickel and cobalt are combined into an alloy, that alloy has physical properties that are not found in any of the individual elements.

5. The Examiner states that the experimental data used by the Appellants to demonstrate the importance of the claimed formulae in producing an alloy of the present invention has not been accompanied with a declaration (page 10, lines 1-3). On the contrary, Appellants have indeed submitted experimental data in declaration form on July 3, 1997. This Declaration supports and explains the data submitted in their Amendment filed on January 3, 1997.

In summary, there is no *prima facie* case of obviousness for iron-nickel-cobalt alloys that contain amounts of nickel and cobalt defined by the three Ni-Co inequality limitations of the present invention. None of the references, JP 04-224,631, JP 04-221,021, Inoue, Fukuda, Ishikawa or Kato, alone or in combination, teach or suggest making a iron-nickel-cobalt alloy that satisfies these inequality limitations. Moreover, none of these references suggest that by controlling the amounts of nickel and cobalt to satisfy these inequality limitations, an alloy is made with physical properties that avoid the common image distortion problems seen in conventional, iron-based shadow masks.

Based on the references, one of ordinary skill in the art would have no reason to expect that an alloy with all the physical properties of the present invention is made by controlling the amount of cobalt and nickel to satisfy the Ni-Co inequality limitations described in the claimed invention. Moreover, based on these references, one of ordinary skill would have no motivation to use an alloy with the physical properties of the claimed invention to make an iron-based shadow mask that avoids well known image distortion problems caused by these masks.

Accordingly, in view of the above comments, explanations, and distinctions between the presently claimed invention and the cited references, Appellants submit that Claims 1-8, 12 and 13 are patentable. The Examiner's rejection should be REVERSED.

Respectfully submitted,

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